
Management
Risk
Software Quality

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Project Planning

- Congratulations! You have just been appointed as the head of a new project.
You look around the room and everyone looks back.
What do you do?

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Project Management

- A "layer" of software engineering, it overlays every stage of the development process.
- We need to manage both the "process" and the "product".
- Project Management starts before all other development activities and continues long after the system is in operation.
- A Project Plan is essential.
- Team Structure is important.

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Project Management Activities

- Project management activities can be summarized as...
 - Planning
 - Estimating time and effort needed for all development tasks, and allocating tasks to people.
 - Monitoring
 - Tracking progress through development
 - Controlling
 - Dealing with conflicts and problems as they arise
 - Resourcing/Infrastructure
 - Managing the environment so that you can produce software

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Planning Activities

- These include:
 - Determine the Scope of project, and System Boundary
 - Determine possible *risks*
 - Identify *resources* required,
 - Determine *tasks* to be done
 - Identify and track *milestones*
 - Determine budget required
 - Allocate tasks to people
 - Set up schedule to be followed
 - Create project plan
- What is a plan use for?
 - To Estimate, Monitor, and Review
 - Follows a cycle (Update/Review)
 - Plans are made to be USED

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Project Plan includes:

- Statement of scope of project
- Project Objectives in terms of performance and constraints
- Major functions of system
- Identification of areas of difficulty, research needed etc. These are the "project risks".
- Schedule for analysis stage.
- Team Organization and Management Reporting Mechanisms

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Fundamentals of Project Planning Models

- A set of things you need to consider for planning:
- Time
- Tasks
- Resources
 - Including people
- Cost of Resources
- Capability of People
 - Knowledge and Personal Qualities

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Milestones and activities: definitions

- Activity: takes place over a period of time
- Milestone: completion of an activity -- a particular point in time
- Precursor: event or set of events that must occur in order for an activity to start (also called a dependency)
- Duration: length of time needed to complete an activity
- Due date: date by which an activity must be completed

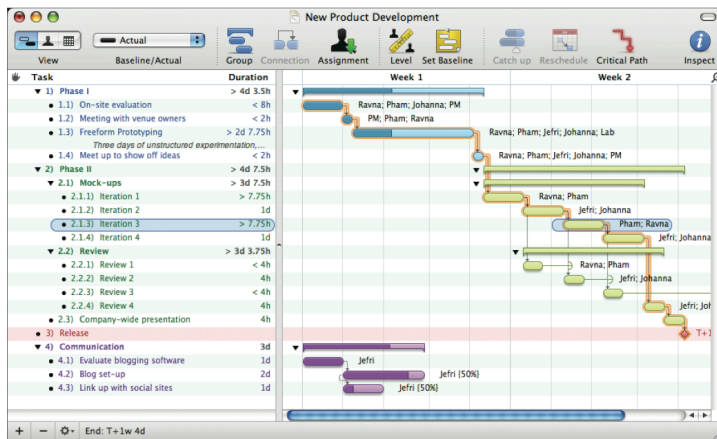
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Slack or float time

- Slack time = available time - real time
= latest start time - earliest start time
 - (For procrastinators: how long can I leave it?)
- Critical path
 - the set of tasks that, if they fall behind schedule, will cause the project to be late
 - This is the longest sequence of dependent tasks
 - It is also the path through the network with no slack!

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Gantt chart software



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Team management

Choosing personnel

- ☐ Ability to perform work
- ☐ Interest in work
- ☐ Experience with similar
 - ☐ applications
 - ☐ tools or languages
 - ☐ techniques
 - ☐ development environments
- ☐ Ability to communicate with others
- ☐ Ability to share responsibility
- ☐ Management skills

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Team problems

- ☐ Problems you may encounter when working in teams include:
 - ☐ Lack of communication
 - ☐ Lack of certainty about what you are doing
 - ☐ Lack of skills
 - ☐ Difficulties with group members (people not contributing, personality clashes, personal problems or crises)
 - ☐ Many teams will find that some members aren't performing as well as hoped.
 - ☐ Some team members will find the team expecting too much
 - ☐ Some people cruising, others want to do things to perfection
 - ☐ Dealing with this requires making expectations explicit

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Communication

- One key to success is to ensure everybody knows what is expected of them, from day 1 right through to project completion
- When work is assigned to someone there are two parties involved
- When work is allocated you need to make clear what an acceptable result is
- The person accepting the work has a duty of care to ensure they understand what is being asked of them
 - Do they understand the language being used?
 - Do they need examples of the output?
 - Do they know how much detail is required?

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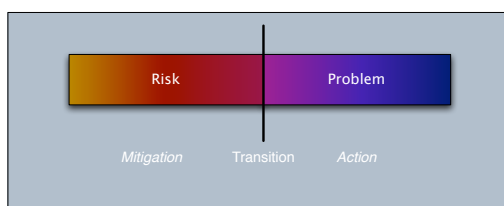
Dealing with problems

- If a person fails to provide the work expected you have to find out why.
- Generally this is accomplished by asking and being willing to listen to the answer.
- To deal with the issue you should
 - explain why the work is considered deficient
 - identify if the problem is short lived or long term
 - note that it is deficient in a record
 - suggest ways in which the person can prevent it from happening again.
- If people are not doing their work you have to be active in getting the reasons from them.
 - *Silence does not equal agreement!*

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Risk Management

- A risk is a problem/liability that might occur (but hasn't yet)
- A risk changes to a problem at *transition*
- Mitigation is work done before transition to reduce the effect of the problem/liability



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How to handle risk

- Risk discovery
 - Brainstorming, Scenario Building, Root Cause Analysis
- Exposure analysis
 - Determine the loss associated with an event, likelihood of the event
 - Risk control - how much we can control the risk
- Risk Mitigation - before a problem occurs
 - The purpose of the mitigation is to describe how this particular risk will be handled – what, when, by who and how will it be done to avoid it or minimize consequences if it becomes a liability.
- Transition monitoring
- Contingency planning - after a problem occurs
 - What to do if the risk is realised.

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Business Continuity planning

- E.g. 44% of businesses fail to reopen after a fire
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Risk treatments

- Risk avoidance
 - Choose not to accept some risk
 - change requirements for performance or functionality?
 - Avoiding risk also means avoiding potential profit.
- Risk reduction
 - Take steps that reduce your exposure to risk.
 - Ensure that multiple people check that an assignment is submitted.
- Transferring the risk
 - Transfer to other system, or buy insurance
- Assuming the risk
 - accept and control it

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Risk Mitigation

- How can you mitigate the following risks?
 - Car accident
 - SEF - Not understanding the concept of risk mitigation?
 - SEF - Team member resigning/falling ill
 - Workplace - Team member resigning/falling ill

Make sure they discuss mitigation, not action after the event.

Car accident - insurance

Failure to submit - submit every day a change is made

Team member resigning - find out Uni policy on late submissions

Workplace Team member - have another team member around; build slack into the timetable; allocate/get approval for funds to cover extra staff. Ask what happens if they can't get the funding? In that case there is no mitigation, and you have to deal with the problem if it occurs

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Risk Exposure

- Expectation of containment cost
 - Risk exposure = Risk probability x Risk impact
 - 20% risk probability on \$100,000 impact = \$20,000 exposure
- You can self insure against this exposure
- Over a long period it should work out neutral

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Boehm's top ten risk items

- Personnel shortfalls
- Unrealistic schedules and budgets
- Developing the wrong functions
- Developing the wrong user interfaces
- Gold-plating
- Continuing stream of requirements changes
- Shortfalls in externally-performed tasks
- Shortfalls in externally-furnished components
- Real-time performance shortfalls
- Straining computer science capabilities

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Quality

- Quality - "Fitness for purpose"
- Who decides if your product has quality?
 - Customer
 - Easy for observables
 - e.g. quality of interaction, GUI, freedom from faults
 - Harder/impossible for other areas without assistance
 - e.g. security, likelihood of continuing upgrades

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Quality

- What do your customers want?
 - They don't always know
- Perhaps the wrong question
 - Ask them what do they do
- Typically they desire quality, they may not put it on a top 10 feature list
 - quality = reliability, usability, consistency, etc.
- Making quality software is about meeting a customer's needs - not necessarily what they say they want.
 - Ensure that quality issues are discussed with the user during the inception/elaboration phase.

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Quality Concepts

- Quality - in SE implies some kind of standard
- Quality of Design
- Quality of Conformance
- User Satisfaction!
- Quality Control - Activities done to control quality
- Reviews, Inspections
- Quality Assurance - auditing and reporting functions of management to Identify and Act on Problems.

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Quality costs

- Prevention Costs
 - quality planning, formal technical reviews, test equipment, training
- Appraisal Costs
 - inspections, equipment calibration/maintenance, testing
- Internal Failure Costs (Prior to Delivery)
 - rework, repair, failure mode analysis
- External Failure Costs (After Delivery)
 - complaint resolution, product return and replacement, help line support, warranty work

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Cost of quality

- Need to identify costs associated with quality to
 - quantify its impact in overheads
 - identify opportunities for improvement
- Which kinds of costs are we prepared to accept?
 - Prevention Appraisal Internal Failure External Failure
- Which kinds of costs do we want to eliminate?
 - Prevention Appraisal Internal Failure External Failure

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Obtaining Quality

- Quality control
 - Activities that measure the quality of products produced
 - E.g. Integration testing, code reviews
- Quality Assurance
 - Activities that focus on the process used to create the product
 - E.g. Ensuring all testing is carried out at each level of the creation of software

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Software Configuration Management

- Configuration Identification
 - What code are we working with?
- Configuration Control
 - Controlling the release of a product and its changes.
- Status Accounting
 - Recording and reporting the status of components.
- Review
 - Ensuring completeness and consistency among components.
- Build Management
 - Managing the process and tools used for builds.

Source : [wikipedia.org](https://en.wikipedia.org/wiki/Software_configuration_management)

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Software Configuration Management

- Process Management- Ensuring adherence to the organization's development process.
- Environment Management- Managing the software and hardware that host our system.
- Teamwork- Facilitate team interactions related to the process.
- Defect Tracking- making sure every defect has traceability back to the source

Source : [wikipedia.org](https://en.wikipedia.org/wiki/Software_configuration_management)

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The SQA plan

- Prepare an SQA plan for a project at the start of the project
 - evaluations
 - audits and reviews
 - standards applicable
 - procedures for error tracking/reporting
 - documents produced by SQA group
 - feedback provided to project team

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SQA Activities

- Assists in selection of the process appropriate to the project
- Reviews SE activities and work products to verify compliance with the defined software process
- Ensures deviations in process and product are reported correctly using the procedure
- Records any non-compliance
 - Should it report to management?

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Quality Standards

- Most well know standard is ISO 9001:2000
- Standard designed to work across different organisational types
 - Section 4 is entitled General Requirements
 - Section 5 is entitled Management Responsibility
 - Section 6 is entitled Resource Management
 - Section 7 is entitled Product Realisation
 - Section 8 is entitled Measurement, analysis and improvement

Source : wikipedia.org

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Quality Standards

- Companies can get accreditation in ISO 9001
- They document their processes, and make sure they have a process for fixing problems
- Independently audited for compliance
- Compliance lasts for a few years, then you have to reaccredit.
- Some criticisms
 - Compliance process is costly & time consuming
 - Doesn't necessarily cause business processes to get fixed

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Problems of being in SQA

- ❑ People may not understand the role correctly
- ❑ Need to be diplomatic when approaching problems
- ❑ SQA often seen as testers at the end of the development process
- ❑ One QA person said that she was not supposed to question the design!
- ❑ Her solution was to...
 - write up the bug as an "enhancement request"
 - write up ramifications of leaving it the way it is and allow management to decide.

Source : tracyb555@my-deja.com (12 Dec 2000)

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References

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- ❑ http://www.mindtools.com/pages/main/newMN_PPM.htm

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